Skull X-rays after mild head injuries

More than a million recently head-injured patients present at accident and emergency (A&E) departments in Britain each year. All but 5% are fully conscious on arrival but, on careful questioning, one in six of these mildly injured patients will admit to amnesia for a short period after injury; some will be reported as having been briefly unconscious. Controversy about the management of these many mildly injured patients centres on how best to minimize avoidable mortality and morbidity from acute intracranial haematoma. A good outcome after this complication depends on early diagnosis and rapid surgical evacuation of the clot. The problem is that this complication develops in only about one in a thousand attenders, as Gorman’s large study confirms (pp. 141–150). The problem is identifying the level of risk in different types of patient so as to avoid the unnecessary admission of large numbers of low-risk patients. Haematomas are much less common in children, who make up about half of head-injured A&E attenders but only one in ten of patients who develop a haematoma (Jennett & Teasdale, 1981). The incidence is three times greater in patients over 65 years than in younger people (Pentland & Roy, 1987); in this age group haematomas are easily overlooked in favour of stroke (Galbraith, 1987). Traditional teaching has been that all patients with a history of even brief post-traumatic amnesia are at risk and should be admitted. However, statistical analysis of several thousand adult patients from A&E departments and primary surgical wards in Scotland has shown that a fracture of the skull is a more important risk factor for haematoma than is briefly altered consciousness (Mendelow et al., 1983). This is confirmed by Gorman’s study as well as by several reports from other countries. The significance of a fracture is greatest after mild injuries, in whom the risk in adults is otherwise very small (1:6000); with a fracture, the risk rises to about one in 300. Guidelines have recommended that fully conscious adults in whom a fracture has been excluded with reasonable certainty can safely be sent home (Neurosurgeons, 1984). Their application has resulted in reducing admissions in some hospitals by a half or more, which means a considerable saving in resources for the NHS and in inconvenience for patients and their families (Mendelow et al., 1982).

The most controversial issue is the role of skull X-rays in making decisions about mild injuries. Most of these decisions are made by A&E staff, but the protagonists in the controversy are mostly radiologists and neurosurgeons. The importance of Gorman’s study is its size, its location in a district general hospital and the careful analysis of the controversy as seen from the A&E department. He comments on how radiologists on both sides of the Atlantic have been complaining about what they see as the indiscriminate and unnecessary use of skull X-rays after mild head injury. They point to the low yield of fractures after mild injuries, which is true; and they allege that no important decisions derive from finding a fracture, which is not true. Moreover, there is evidence that clinicians already exercise considerable restraint in ordering skull X-rays: in Gorman’s study 44% were X-rayed and in the Glasgow survey of Scotland it was 58%.
Part of the problem is that some radiologists seem to regard the discovery of a fracture as the object of the exercise and they have, therefore, produced clinical criteria that produce a high yield of fractures. But most such patients have obviously suffered substantial injury and will have to be admitted in any event. Radiologists seem not to realise that it is prediction of serious complications after mild injury rather than detecting the presence of intracranial damage that is of greatest concern to clinicians. When it comes to costs, radiologists emphasize those associated with X-ray of the skull but not those associated with unnecessarily admitting thousands of patients.

The study of the Royal College of Radiologists was limited to patients who were X-rayed and its calculation of the cost of detecting one intracranial haematoma was based on the finding of only seven haematomas (National Study, 1981). By contrast, the Glasgow-based studies analyzed several thousand patients from A&E departments and primary surgical wards as well as over 500 adult haematomas in one neurosurgical unit (Mendelow et al., 1983). Further fuel has been added to this dispute since Gorman's paper was submitted by the report from the US of an FDA study (Masters et al., 1987) which claims similar findings to the RCR study. However, this study did not mention intracranial haematoma, only intracranial injury; it also failed to distinguish clearly between adults and children. Gorman has commented critically on this study (Gorman, 1987), as have others (Jennett & Teasdale, 1987). In any event, the problems that face emergency room doctors in the US are different from those that obtain in Britain. Neurosurgeons are much more numerous and their advice can often be obtained before sending patients home from emergency departments. This may account for the much lower admission rate after mild injuries in the US. Scanners are also much more widely available in the US. The important role that X-rays play in Britain in selecting patients for admission, for neurosurgical referral and for scanning after head injury may, therefore, be largely irrelevant in the US. In Britain, there can be little doubt that skull X-ray will continue for some time to be an important component of triage for mild head injuries. To be effective, its role needs to be better understood and measures taken to ensure that staff in A&E departments are trained both in the interpretation of skull X-rays and in the management of head injuries.

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BRYAN JENNETT

University Department of Neurosurgery,
Institute of Neurological Sciences,
Glasgow,
Scotland
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B Jennett

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